Understanding Educational Inequality in Hong Kong: Secondary School Segregation in Changing Institutional Contexts

Article *in* British Journal of Sociology of Education · June 2019

DOI: 10.1080/01425692.2019.1642736

3 authors, including:

Soo-yong Byun
Pennsylvania State University
76 PUBLICATIONS **1,222** CITATIONS
SEE PROFILE

Moosung Lee
University of Canberra
108 PUBLICATIONS **1,398** CITATIONS
SEE PROFILE

British Journal of Sociology of Education

ISSN: 0142-5692 (Print) 1465-3346 (Online) Journal homepage: https://www.tandfonline.com/loi/cbse20

Understanding educational inequality in Hong Kong: secondary school segregation in changing institutional contexts

Beatrice Oi-yeung Lam, Soo-yong Byun & Moosung Lee

To cite this article: Beatrice Oi-yeung Lam, Soo-yong Byun & Moosung Lee (2019) Understanding educational inequality in Hong Kong: secondary school segregation in changing institutional contexts, British Journal of Sociology of Education, 40:8, 1170-1187, DOI: 10.1080/01425692.2019.1642736

To link to this article: https://doi.org/10.1080/01425692.2019.1642736

BRITISH JOURNAL OF SOCIOLOGY OF EDUCATION
2019, VOL. 40, NO. 8, 1170–1187
https://doi.org/10.1080/01425692.2019.1642736

Routledge
Taylor & Francis Group

Understanding educational inequality in Hong Kong: secondary school segregation in changing institutional contexts

Beatrice Oi-yeung Lam[a], Soo-yong Byun[b] and Moosung Lee[c,d]

[a]School of Arts and Social Sciences, The Open University of Hong Kong, Hong Kong; [b]Department of Education Policy Studies, The Pennsylvania State University, University Park, PA, USA; [c]Faculty of Education, University of Canberra, Canberra, Australia; [d]Department of Education, Yonsei University, Seoul, South Korea

ABSTRACT

Since the mid-1990s, important education policy changes, such as the growth of Direct Subsidy Scheme (DSS) schools and the reform of the medium of instruction (MOI) policy, have been made in Hong Kong. Little is known about their impact on school segregation and educational inequality. We address this issue using six successive cycles of the Trends in International Mathematics and Science Study data. We found evidence for rising levels of secondary school segregation in terms of family socio-economic status and mathematics achievement from 1995 to 2011, whereas segregation declined from 2011 to 2015. We speculate that the salience of the MOI policy in expediting the segregating tendencies of the DSS sector might explain a growing magnitude of the effect of family socio-economic status on academic achievement between 1995 and 2011, and the reversed direction of such trends between 2011 and 2015. Implications are discussed.

ARTICLE HISTORY
Received 2 July 2018
Accepted 12 June 2019

KEYWORDS
Educational inequality; school segregation; school choice; Hong Kong

Introduction

Since 1978, nine years of free and compulsory education – including six years of primary schooling (P.1–P.6) and three years of junior secondary schooling (S.1–S.3) – was provided to all in Hong Kong (Pong and Post 1991). From 2009/10 onwards, free education has been extended to 12 years, with students attending three years of senior secondary schooling (S.4–S.6) before they qualify for university education. The proportion of Hong Kong residents who attained a bachelor's degree programme by ages 19–20 was 1.3% in 1981 (Post 2010, 245, Table 1). By 2015, 23.3% of the local population aged 15 years or above had attained a bachelor's degree (Census and Statistics Department 2017). Despite this, socio-economic disparities in the rate of entering universities have been increasing (Chou 2013 as quoted in Poon 2013).

This article examines how local institutional features impinge on trends of educational inequality in Hong Kong between 1995 and 2015. We first hypothesize how educational inequality changed over time in the context of the interplay between the Direct Subsidy

CONTACT Moosung Lee leemoosung@gmail.com
An early version of this paper was presented at the Spring Meeting of the International Sociological Association's Research Committee 28 on Social Stratification and Mobility, May 24-27, 2018, Seoul, South Korea

Scheme (DSS) and the medium of instruction (MOI) policy. In particular, we are interested in the effects of such interplay of policy measures on secondary school segregation. Following this, we test our hypotheses using data from the Trends in International Mathematics and Science Study (TIMSS). We conclude by highlighting how the intersection between the colonial legacy of a linguistic symbolic order (Lin 1996) and socio-economic stratification bears upon social differentiation in school choice-making and segregating tendencies in a marketized education system.

Literature review

School segregation and socio-economic disparities in educational outcomes

School segregation can be understood as the extent to which various social groups are (un) evenly distributed among schools within a specific geographical territory (cf. James and Taeuber 1985; Massey and Denton 1988). It manifests in the way racial (e.g. in the United States; Orfield and Lee 2005), socio-economic (e.g. in Greece; Dronkers and Levels 2006), immigrant (e.g. in Germany; Dronkers and Levels 2006) and cultural and linguistic (e.g. in Australia; Ho 2011) backgrounds systematically partition students into separate schools. In Sweden, increasing social and cultural segregation of students has been accompanied by greater variation in educational outcomes between schools, and between children, by social origin and ethnicity (Lundahl et al. 2013, citing various sources). In the United States, relatively disadvantaged students are concentrated in schools with a high level of poverty (Orfield and Lee 2005), whereas public schooling has been increasingly re-segregated since the 1980s along intersecting lines of race, ethnicity, linguistic status and family income (Mickelson 2014). Along the lines of segregation, an uneven distribution of school resources (e.g. physical facilities), teaching quality and curriculum, social networks and social capital, high-achieving peer role models, as well as language exposure explains the link between school segregation and achievement (cf. Reardon and Owens 2014; Shum, Gao, and Ki 2016). Low levels of achievement of minority students have therefore been consistently reported (Borman et al. 2004; Orfield and Lee 2005).

School segregation is often explained by residential segregation (Reardon and Owens 2014). Nonetheless, as shown in the English context, school segregation needs to be examined in terms of social differences in school choice-making on top of considerations of how residential segregation factors in (Coldron, Cripps, and Shipton 2010). In Chile, dynamics of the school 'market' vary with evolving patterns of socio-economic segregation of schools among municipalities in a way that cannot be entirely explained by residential segregation (Valenzuela, Bellei, and de los Ríos 2014). This suggests that potential sources of school segregation lie elsewhere.

School choice, school segregation and socio-economic inequality in education

Since the 1980s, market competition and school choice policies began to be introduced to cross-continent educational contexts. This is geared presumably towards the more 'efficient' production of student achievement and hence competitive citizens in the global economy. Specific policies vary, but reforms are characterized by increasingly privatized school provision. Publicly-funded schools operating independently of the public school system

compete with the public sector for students, per-capita funding and resources (Ball and Youdell 2008; Brown and Lauder 1996). Examples include charter schools in the United States, 'free schools' and academies in the United Kingdom, independent 'free schools' in Sweden and DSS schools in Hong Kong. It is claimed that the said reform measures help to reduce school segregation and promote educational equality through allowing parents the freedom of choice and liberating disadvantaged students from dysfunctional neighbourhood schools (Coleman 1992). Purportedly, with parents 'voting with their feet', underperforming schools will be weeded out, thus compelling schools to improve, and hence raising educational efficiency (Chubb and Moe 1990).

Empirical research assessing the extent to which school choice policies equalize is not always amenable to meaningful comparison and analytic generalization. This is due to the diverse research methodologies adopted, in terms of the research scale, measurements of segregation and the institutional and/or national contexts addressed (for a review, see Gorard and Fitz 2006). In cases where findings suggest segregating tendencies, researchers have proposed possible mechanisms that confound the promises of market reforms in education, as we elaborate in the following.

On the one hand, schools have come under pressure to perform well in 'league tables' of student performance in high-stake, standardized tests, which are increasingly employed as an indicator of 'school effectiveness' and market competitiveness (Townsend, Macbeath, and Bogotch 2016). Schools are thus inclined to 'skim the crème' by admitting and 'investing' in students from socio-economically advantaged backgrounds (Ball 2003; Gewirtz, Ball, and Bowe 1995; Robert 2010; Valenzuela, Bellei, and de los Ríos 2014) so as to produce 'educational efficiency' in a more 'cost-effective manner', while those disadvantaged socio-economically or in learning are shunned (Beach and Sernhede 2011; Coldron, Cripps, and Shipton 2010).

On the other hand, socio-economically advantaged parents are found to be navigating the increasingly diversified school 'market' with their economic, cultural and social capitals (Brown and Lauder 1996; Robert 2010; Valenzuela, Bellei, and de los Ríos 2014; Zhou, Cai, and Wang 2016). Compared with their more disadvantaged counterparts, they are more likely to afford to send their children to fee-paying private or semi-private (e.g. DSS) schools, be familiar with the school system and to access relevant information in and/or through their social networks. They can also capitalize upon school choice policies to steer their children clear of schools with a disadvantaged population intake (Saporito 2003; Lundahl et al. 2013; Roda and Wells 2013). School choice therefore tends towards the partitioning of students of different socio-economic backgrounds into separate schools segregated between the public and the private divide (Ball 2003), and therefore differentiated educational experiences (Byun and Kim 2010; Robert 2010; Valenzuela, Bellei, and de los Ríos 2014). In this sense, marketization and choice policies cannot guarantee expanded access to quality education. Rather, it could have served to cement middle-class advantage in the competition for credentials (Brown and Lauder 1996), as well as created and reinforced existing social segregation (Coldron, Cripps, and Shipton 2010; Gewirtz, Ball, and Bowe 1995).

The local institutional and socio-cultural context could contribute to expediting the segregating tendencies of educational marketization and choice policies, as exemplified in the influence of Korea's Hakbul-based society on the credentials struggle and educational privatization (Oh 2011). It could also moderate such tendencies, to which the Swedish

socio-democratic welfare regime attests (Lundahl et al. 2013). Our discussion as follows thus attends to market mechanisms that are linked to, yet simultaneously distinctive from, reported findings of mostly western societies in the extant literature. That is, the intersection between the local linguistic symbolic order (Lin 1996) and socio-economic stratification bears upon school segregation in a marketized education system in a way specific to the interplay of education policies in Hong Kong. Coupled with this, we underline the need to qualify a dominant narrative of the inequitable consequences of marketization and choice policies by providing a more nuanced account of the configuration of socio-economic and linguistic segregation, the latter of which has hitherto more predominantly represented in the literature on racial–ethnic inequalities in education (for a review, see Shum, Gao, and Ki 2016).

Context

In this section, we describe the institutional context of our inquiry. We recognize how market competition and school choice policies could segregate schools, subsequently widening socio-economic disparities in educational outcomes. Hence, our focus is on post-1990s policy changes, particularly since the advent of DSS schools (1991 onwards) and its rise and interplay with the MOI policy (1998–2015).

Market competition and school choice

Since 1978, secondary school places have primarily been allocated based on prospective S.1 students' assessed ability level and their 'school net'; that is, the designated school catchment area under the Secondary School Places Allocation system. Outside this 'central allocation' system, students can also apply for 'discretionary places', reserved by schools to admit students at their own discretion, in no more than two schools outside their school net. Public schools allocate at least 70% of their places via central allocation. The private school sector has, until the late 1990s, been poorly financed, unpopular among local parents and catered to lower-achievers (Cheung, Randall, and Tam 2005, 143; Tse 2008).

The DSS was launched in 1991 as a move to revitalize the private school sector, diversify school provision, facilitate greater parental choice and boost between-school competition (Tse 2008). DSS schools are run as private schools on a government subsidy calculated on a per-capita basis, and enjoy autonomy with respect to tuition fees, student admission, curriculum, MOI and so forth. Alongside other private schools, DSS schools can allocate 100% of their places on a discretionary basis, or elect to participate in the Secondary School Places Allocation system while reserving more than 30% of their places as discretionary places. DSS schools were initially unpopular (Cheung, Randall, and Tam 2005, 156–159). Nonetheless, under revised terms, DSS schools were later allowed to charge high tuition fees to a certain level without losing any subsidy (2005, 158). The proportion of DSS secondary schools among all secondary schools thus increased from 5.6% in 2001 to 12% in 2012 (Education and Manpower Bureau 2003; Education Bureau 2012).

The interplay between the Direct Subsidy Scheme and the medium of instruction policy

The rise of DSS schools attests to the appeal of the 'market logic' of school choice to the stakeholders concerned. Nevertheless, the popularity of DSS schools cannot be disentangled from the impact of the MOI policy, which was effective from 1998 to 2010, and that of the fine-tuned MOI policy since 2010/11.

Achievement in English language at school had long served as a mechanism of elite selection and social mobility in colonial Hong Kong (Kan and Adamson 2010). After 1949, apart from Anglo-Chinese secondary schools adopting English as the primary MOI (EMI), schools adopting Chinese as the primary MOI (CMI) were established. The colonial government had, however, persistently emphasized the international value of English language learning and the need to respond to market preferences for EMI schooling (Choi 2003; Kan and Adamson 2010). Over time, EMI secondary schooling has come to be recognized as a symbol of distinction vis-à-vis its CMI counterpart (Lin 1996). In 1997, over 90% of secondary schools claimed to be EMI schools (Falvey 1998 as quoted in Lo and Lo 2014).

Shortly after the 1997 handover, the Education Department announced that only the best 30% of secondary school students could go to EMI schools (Choi 2003). All but about 25% of secondary schools would then adopt 'mother tongue education' – that is, a CMI teaching mode (for all academic subjects except for English language and English literature) – from S.1 to S.3. EMI education and its presumed benefits for English language proficiency has continued to be recognized as a cultural capital indispensable for competitiveness and social mobility in the global market (Poon 2013). With the adoption of EMI restricted to a selected few under the mother tongue education mandate, local parents began to question the capacity of mainstream public secondary schooling to nurture a good command of English in students (Tse 2008). Converting into DSS schools thus emerged as a viable strategy for secondary schools to enhance their 'marketability'. As DSS schools could adopt EMI unrestricted by the academic ability of their S.1 intake, they appealed to those who coveted an EMI education when EMI education became less accessible in the public school sector. In particular, joining the DSS proved popular among public schools enjoying a traditionally 'elite' status as they sought to stay competitive when territory-wide student intake was expected to fall (Poon and Wong 2008). What ensued was an increasing concentration of EMI schools, including top-performing 'elite' schools, in the (semi-)private DSS school sector.

The segregating tendencies of the interplay between the Direct Subsidy Scheme and the medium of instruction policy

The increasing number and proportion of DSS schools has profound implications for stratification in secondary schooling. They are fee-paying and are therefore selective of those who have the financial capacity to pay (Tse 2008). They enjoy more autonomy than public schools in selecting students who boast a better academic track record and who are better supported educationally by family resources. They can therefore maintain their market competitiveness in presumably the most 'cost-effective' manner (see Ball 2003). With written assessments prohibited in student admission processes, DSS schools often select students through assessment of portfolios and interviews – sometimes of both students and parents – according to relatively opaque criteria. Children from socially privileged backgrounds are

in a more advantageous position to compete because their parents are more likely to have the cultural and social capital needed for negotiating the admission process (Tse 2008). Taken together, the rise of DSS schools necessitates an increasingly larger share of fee-paying schools in the education system, of which student admission is skewed in higher-socio-economic status (SES) students' favour. This could have contributed to the systematic partitioning of students of different SES into the public–(semi-)private divide (Zhou, Cai, and Wang 2016).

Nonetheless, the appeal of DSS schools cannot be disentangled from the effects of the MOI policy. Parents' loss in confidence in the teaching and learning of English of public schools might have been widespread, but it was those who had cultural, economic and social capital at their disposal who were more likely to opt for DSS schools as an alternative to public schools under the MOI policy (Tse 2008). In this sense, the MOI policy could have accentuated the tendencies of the DSS to set students of different socio-economic backgrounds apart. It could have intensified the dividedness of students' experience in terms of access to resources and levels of achievement as brought about by the DSS. For those whose families were disadvantaged in their competition for DSS secondary school places, the MOI policy might have restricted their accessibility to both EMI education and to higher-performing schools. This is because, under the MOI policy, only the best-performing students were entitled to EMI education in the public school sector (Choi 2003), whereas an increasing number of 'elite' public schools converted into DSS schools (Tsang 2002; Tse 2008).

Taken together, the MOI policy, with its interplay with the DSS, in effect disproportionately deprived socially disadvantaged parents of choices of EMI schooling and of higher-performing schools in the public secondary school sector (Tse 2008). This necessitated the uneven distribution of the potential educational benefits derived from the experience of EMI schooling (Lo and Lo 2014) and that of studying in 'elite' schools (Tsang 2002). In a nutshell, the interplay between the DSS and the MOI policy could have contributed to differentiate levels of achievement among students of different socio-economic backgrounds across the public–(semi-)private divide and widen between-school variance in achievement.

The implications of the fine-tuning of the medium of instruction policy

From 2010/11 onwards, the MOI policy began to be 'fine-tuned'. Secondary schools are granted the flexibility to adopt more diversified MOI teaching modes (Poon 2013; Lo and Lo 2014). EMI education thus becomes more widely accessible in the public school sector in a way not exclusive to the 'best', and less a prerogative of those whose families can amass the capitals to compete in the fee-paying sector. There is also less pressure for parents to seek recourse to the (semi-)private sector to secure their children an EMI education.

Given the severed link between MOI and DSS schools, the propensity for the DSS to sort students of different socio-economic backgrounds into secondary schools segregated across the public–(semi-)private divide could have mitigated from 2010/11 onwards. Students' educational experiences could have become less segregated as well. Students of different socio-economic backgrounds could have become more spread out in the system, therefore lowering the level of between-school variance in their achievement outcomes.

Hypotheses

Up to this point, we have established the segregating tendencies of school privatization and school choice policy as they transpire in the interplay between the DSS and the MOI policy in Hong Kong.

In the light of the aforementioned, we hypothesize the following:

- Hypothesis I: Educational inequality had grown over time in the context of the interplay between the DSS and the MOI policy, with a higher level of socio-economic segregation among secondary schools and a widening between-school variance in student achievement.

With the fine-tuning of the MOI policy, the severance of the link between MOI and DSS schools means that the MOI policy ceases to operate as a mechanism that expedites the tendencies of the DSS to partition students of different SES into schools, schooling experiences and achievement outcomes. We thus hypothesize that:

- Hypothesis II: With the fine-tuning of the MOI policy, secondary schools could have become less socio-economically segregated, and the level of between-school variance in achievement could have declined.

Taking Hypotheses I and II together, the interplay between the MOI policy and the DSS can be understood to have made it possible for SES to more forcefully assert its influence on patterns of achievement via school place allocation. With the removal of the EMI–CMI bifurcation, this becomes less a possibility. With this, we hypothesize that:

- Hypothesis III: The magnitude of the effect of SES on achievement and the relationship between SES and achievement strengthened in the context of the interplay between the DSS and the MOI policy. With the MOI policy fine-tuned, the relevant trends would take an opposite direction.

Methods

Data and sample

To test these hypotheses, we used data from the TIMSS database. TIMSS has been the source of one of the most extensive, large-scale international assessments of student achievement since 1995, with 57 countries and more than 580,000 students around the world participating in 2015. Conducted every four years, TIMSS measures student performance in mathematics and science among students in Grade Four and Grade Eight. TIMSS also collects a variety of information on students' family background, attitudes towards learning and school experiences. TIMSS employs a stratified sampling design in which each participating country randomly samples the schools to be tested; one class is randomly chosen for each of these schools; and all students within the randomly selected class are tested in both mathematics and science, yielding a nationally representative sample of students for each country (Olson, Martin, and Mullis 2008).

In this study, while examining all six cycles (i.e., 1995, 1999, 2003, 2007, 2011 and 2015), we focused on Grade Eight students. The number of sampled schools that participated in the TIMSS test in Hong Kong varied from 86 in 1995 to 133 in 2015. The number of students assessed also differed from 6752 in 1995 to 4155 in 2015. Yet the students were representative of Grade Eight students that year in Hong Kong (see Appendix 1 for the number of schools and students for each cycle). We included all students assessed for each cycle.

Measures

Student achievement

TIMSS assesses students' knowledge of a wide array of content dimensions in mathematics and science. In this study, we focus on mathematics performance because mathematics skills in lower secondary education represent an important foundation for future learning at the upper level of education as well as future opportunities for employment and income (Mullis, Martin, and Foy 2008). However, we also present results for science achievement in Appendix 1. Based on item response theory, TIMSS provided five plausible values that were generated for each student based on their responses to the test items given (Mullis, Martin, and Foy 2008). Plausible values are more appropriate to estimate population parameters such as the mean and variance than a fixed value, as they are randomly drawn from the posterior distribution for a student's ability (Mullis, Martin, and Foy 2008). These plausible values were scaled to have an international mean of 500 and an international standard deviation of 100. Following the recommendations of TIMSS (for example, Olson, Martin, and Mullis 2008), we simultaneously used the five plausible values of mathematics achievement to generate correct standard errors.

Family socio-economic status

TIMSS provides information that can be used as a proxy for family SES, including parental education, the number of books in the home and home possessions. In each cycle, the TIMSS measures these variables using the same scale with the exception of parental education. In 1999, for example, TIMSS asked parental education in seven categories: some primary school; finished primary school; finished some secondary school; finished secondary school; some vocational education; some university; and finished university. In 2007, TIMSS measured parental education using the International Standard Classification of Education (ISCED) of UNESCO, including: did not finish ISCED 1 (primary education); ISCED 2 (lower secondary); ISCED 3 (upper secondary); ISCED 4 (non-tertiary post secondary); ISCED 5B (vocational tertiary); ISCED 5A (theoretically oriented tertiary and postgraduate) first degree; and beyond ISCED 5A. We recoded these into estimated years of schooling (e.g. finished university or ISCED 5A = 16) and chose the longest year of schooling attained by either parent. The number of books in the home was categorized as follows: 1 = 0–10 books; 2 = 11–25 books; 3 = 26–100 books; 4 = 101–200 books; and 5 = more than 200 books. Finally, we constructed an index of home possessions (sum) using information on whether the respondent had a computer and student desk at home. Using these three indicators, we created a standardized index of family SES with a mean of zero and a standard deviation of one within each cohort, not across cohorts, to avoid capturing differences in this measure between cohort groups.

Analytic strategies

We first conducted descriptive statistics to examine how the average and distribution of mathematics achievement changed over time. Second, following Willms' (1986) study, we estimated intraclass correlations (ICCs) for SES and mathematics achievement as outcomes for each cohort to examine the extent to which total variance in these variables lies between schools. The greater the ICC for a set of schools, the greater the dissimilarity in school socio-economic and academic composition, suggesting segregation (Willms 1986). Therefore, ICCs are helpful for our understanding of how school segregation in terms of SES and mathematics achievement changed over time (Byun, Kim, and Park 2012; Willms, 1986). Finally, to examine trends in the magnitude and strength of the relationship between SES and mathematics achievement, we used ordinary least squares regression. The ordinary least squares model was specified for each cohort as follows:

$$(\text{mathematics achievement})_i = b_0 + b_1(\text{SES})_i + r_{i,}$$

where i refers to the students; b_0 is the average mathematics achievement adjusted for SES; b_1 is the effect of family SES on mathematics achievement; and r_i is a residual. Note that we were interested in how the coefficient b_1 changed over time, as this indicated how the degree of the effect of family SES on match achievement changed over time. We were also interested in how R^2 values changed over time, as they indicated how the strength of the relationship between family SES and mathematics achievement changed over time.

We replaced missing data on family SES using multiple imputations (see Appendix 1 for the percentage of imputed data). Following recommendations set forth by Johnson and Young (2011), we included all of the dependent variables, SES and immigration status in the imputed model. We additionally included immigration status, as research suggests the importance of the relationship between SES and immigration status in Hong Kong (Ou and Pong 2013; Pong and Tsang 2010). While research indicates that accurate results can be obtained from two to 10 imputations (Rubin 1987; von Hippel 2005), we generated 25 imputed data sets for each cycle in order to increase the precision and minimize the bias, using the Stata ICE module. In each imputed data set, missing values were replaced with a plausible random value drawn on observed values of all variables (von Hippel 2005). We then conducted ordinary least squares regression analyses with each of the 25 imputed data sets and averaged coefficients and standard errors across the 25 imputed data sets, using Rubin's (1987) rule. Finally, following the recommendations of the TIMSS (Olson, Martin, and Mullis 2008), we used the final student weights (TOTWGT) to correct for design effects for each cohort; this allowed the results to be generalized to the target population in each cohort.

Results

Trends in the average and distribution of mathematics achievement

Figure 1 shows a change in the average and distribution of mathematics achievement between 1995 and 2015 among Grade Eight students in Hong Kong. Results showed that average mathematics achievement increased from 576 in 1995 to 586 in 2003, but dropped to 572 in 2007. However, it then increased to 586 in 2011 and to 594 in 2015. The trend in the distribution of mathematics achievement showed an opposite direction: the distribution

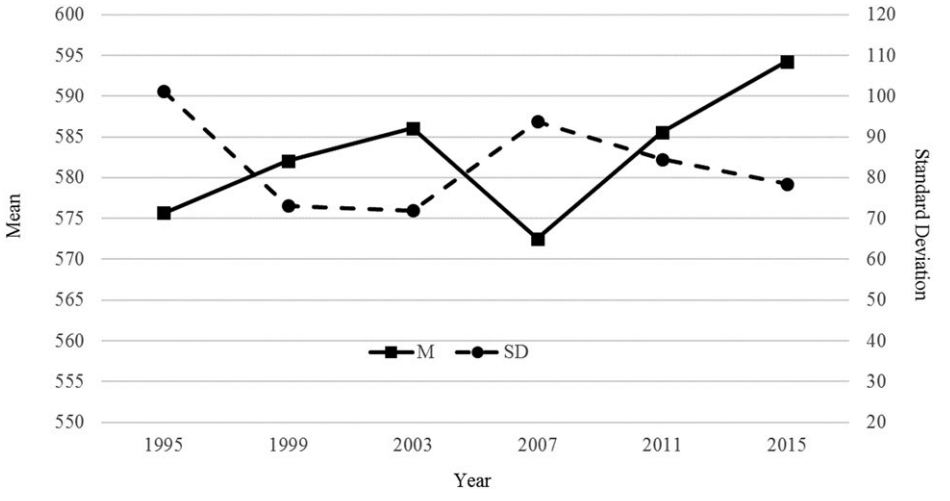

Figure 1. Trends in the average and distribution of mathematics achievement between 1995 and 2015. Note: The left-hand side of the *y* axis indicates the average of mathematics achievement and the right-hand side the distribution (i.e. standard deviation). The *x* axis indicates years. The solid line indicates a change in the average of mathematics achievement. The dashed line indicates a change in the distribution of mathematics achievement.

of mathematics achievement decreased from 101 in 1995 to 72 in 2003, but increased to 94 in 2007. It then decreased to 84 in 2011 and to 78 in 2015. These results indicate that both excellence and equality might have been improved between 1995 and 2003, but they may have been worsened in 2007. Yet they might have been improved again in 2011 and 2015.

Trends in school segregation

Figure 2 shows the trends in ICCs for SES and mathematics achievement between 1995 and 2015. Results showed that the ICC for SES increased from 0.30 in 1995 to 0.32 in 2003. It further increased to 0.36 in 2011 and then decreased to 0.34 in 2015. Similarly, the ICC for mathematics achievement increased from 0.42 in 1995 to 0.58 in 2003 to 0.64 in 2007, and then levelled off in 2011. It decreased to 0.56 in 2015. These results suggest that school segregation in terms of SES increased over time at least between 1995 and 2011 among Grade Eight students in Hong Kong, and has decreased since then. In terms of school segregation by mathematics achievement, this kept increasing during the period between 1995 and 2007, but it has started to decrease since then.

Trends in the magnitude and strength of the relationship between family SES and mathematics achievement

Figure 3 shows the trends in the magnitude and strength of the relationship between SES and mathematics achievement between 1995 and 2015. Results show that the magnitude of the effect of family SES on mathematics achievement decreased from 1995 to 2003 but increased since then. For example, one standard deviation change on the index of family SES was associated with about an 18-point increase in mathematics achievement in 1995. The corresponding association was approximately 16 points in 2003, but 28 points in 2011.

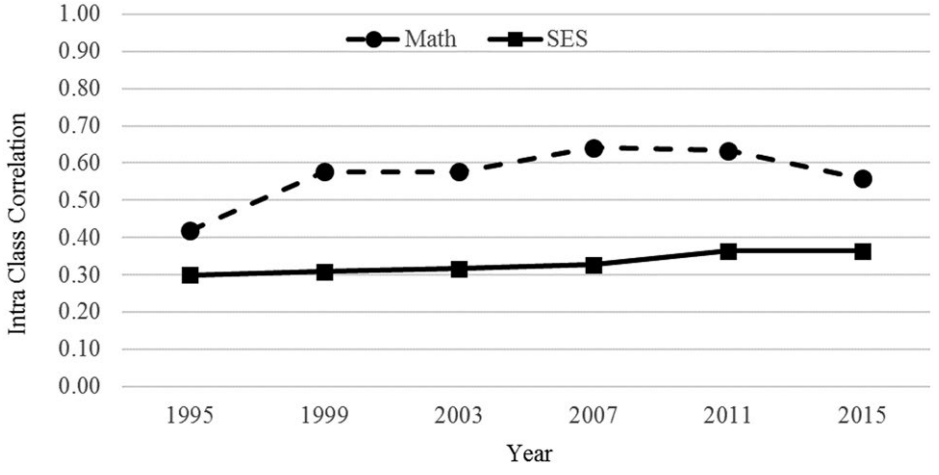

Figure 2. Trends in the intraclass correlation of socio-economic status and mathematics achievement between 1995 and 2015. Note: The solid and dashed lines indicate a change in the ICCs for SES and mathematics achievement, respectively.

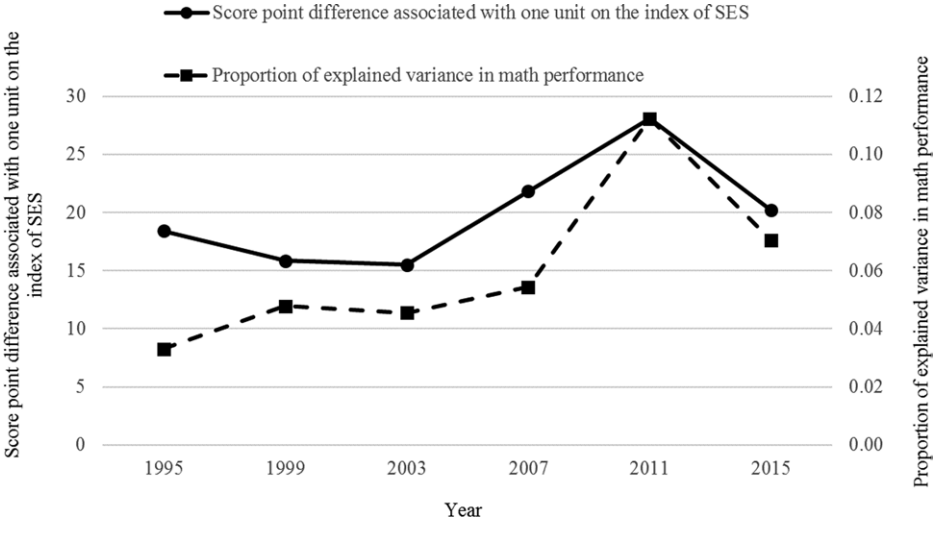

Figure 3. Trends in the magnitude and strength of the relationship between family socio-economic and mathematics achievement between 1995 and 2015. Note: The left side of the *y* axis indicates a score point difference associated with one unit on the index of SES and the right side a proportion of explained variance in mathematics achievement by SES. The *x* axis indicates years. The solid line indicates a change in the magnitude of the impact of SES on mathematics achievement. The dashed line indicates a change in the strength of the relationship between SES and mathematics achievement.

Likewise, the strength of the relationship between family SES and mathematics achievement also increased between 1995 and 2011. The proportion of variance in mathematics achievement explained by SES was 0.03 in 1995 but 0.11 in 2011. However, both the magnitude and strength of the relationship between family SES and mathematics achievement decreased in 2015. These results indicate that educational inequality increased over time between 1995 and 2011 among Grade Eight students in Hong Kong, whereas it has decreased since 2011.

Discussion

Our analyses of the trends of ICCs between 1995 and 2011 using TIMSS data largely support Hypothesis I. That is, in the context of the interplay between the DSS and the MOI policy, there was growing educational inequality in terms of a higher level of socio-economic segregation among secondary schools and a widening between-school variance in mathematics achievement. Arguably, this is mainly because of the salient proclivity of DSS schools to draw disproportionately students of higher SES (Tse 2008; Zhou, Cai, and Wang 2016). Specifically, with their increase in number and in proportion from 1999/2000 onwards, DSS secondary schools could have contributed to the systematic partitioning of students of different SES into schools across the public–(semi-)private divide, hence segregating their schooling experiences and widening between-school variance in mathematics achievement.

What is noteworthy is that the almost doubling of the number of DSS schools between 1998/99 and 1999/2000 (from 10/471 schools to 19/480 schools) (Education Department 2001) coincided with the implementation of the MOI policy, which restricted EMI education to the best-performing schools in the public sector from 1998/99 to 2009/10. With this in mind, DSS schools' disproportionate intake of higher-SES students as reflected in the observed segregation trends should also be understood in no small part as a result of the competitive advantage of these schools in their autonomy in providing EMI education.

The reversed direction that such trends took between 2011 and 2015, by when the MOI policy was fine-tuned, offers further support for our hypothesis of the effects of the MOI policy in its interplay with the DSS in producing the observed segregation trends between 1995 and 2010. DSS schools could have disproportionately drawn higher-SES secondary students not only because the latter were favourably positioned in the school 'market' in the negotiation of choice (Tse 2008; Zhou, Cai, and Wang 2016). This occurred also because, under the MOI policy, DSS schools could have capitalized on their autonomy in MOI to disproportionately draw higher-SES students, whose parents considered DSS schools a more reassuring source of global cultural capital (Poon 2013). Contrarily, for lower-SES families, the MOI policy restricted their accessibility to both EMI education and higher-performing 'elite' schools when an increasing number of the latter converted into DSS schools (Tsang 2002; Poon and Wong 2008).

Seen in this light, it was the interplay between the MOI policy and the DSS that could have conspired to set apart students of different SES into schools separated across the public–(semi-)private divide. The attendant differentiation of their schooling experiences, primarily in terms of school resources and curriculum, contributed to widen between-school variance in mathematics achievement. Such dividedness of educational experience was expected to have been amplified by the EMI–CMI divide, especially when top-performing schools, with their social capital and the abundance of high-achieving peer role models (Tsang 2002), were often EMI schools at the same time.

If the MOI policy indeed contributed to expedite the segregating tendencies of the DSS, the removal of the EMI–CMI bifurcation would eliminate a salient segregating force in the education system. By this logic, we expect that the observed trends of segregation among secondary schools would be attenuated in the context of a fine-tuned MOI policy (Hypothesis II). The downward trends of the ICCs between 2011 and 2015 support our

hypothesis. With the MOI policy fine-tuned from 2010/11 onwards, the accessibility to EMI education is no longer exclusive to the best-performing secondary schools in the public sector. This could have undercut the appeal of DSS schools. The severed link between MOI and DSS schools means the MOI policy ceases to be a mechanism that expedites the tendencies of the DSS to partition students of different SES into separate schools, differentiating their schooling experiences across the public–(semi-)private divide, hence widening between-school variance in mathematics achievement.

Our propositions in relation to Hypotheses I and II imply that the interplay between the MOI policy and the DSS could have made it more possible for SES to intervene in patterns of achievement via school place allocation. Also, the room for SES to assert its influence in this respect is likely to have been curtailed when the EMI–CMI bifurcation is removed from 2010/11 onwards. This is consistent with our finding of the revered direction taken between 2011 and 2015 by the upward trend of both the magnitude of the effect of student SES on mathematics achievement and the strength of the relationship between student SES and mathematics achievement.

As such, the analysis of TIMSS data supports our hypotheses that secondary schools have become more segregated in post-1990s Hong Kong, in such a way that substantially widens between-school variance in academic achievement and gradually strengthens the relationship between family SES and academic achievement. We are able to infer how the observed trends can be interpreted as a product of relevant policy changes – notably, the MOI policy and the increasing popularity of DSS schools from 1999 onwards. Our findings are consistent with international observations of the increasing tendency for student achievement to be explained by between-school variance during periods of market reforms of education (for example, Byun and Kim 2010). The enhancement of average academic achievement of Hong Kong secondary school students over time could have indeed been brought about by choice policies and the privatization of school provision (Chubb and Moe 1990). This, however, may not necessarily be followed by the equality of students' access to school resources (Tse 2008), learning experiences and educational outcomes.

Complementing previous research using cross-sectional data of international assessments (for example, Ho 2010; Lam and Lau 2014), our study underscores why, while looking into local manifestations of educational marketization, it is imperative for researchers to attend to how the intersection between the colonial legacy of a linguistic symbolic order (Lin 1996) and socio-economic stratification bears upon social differentiation in school-choice making. With this, we highlight how diminishing between-school variance in mathematics achievement and influence of family SES on mathematics achievement between 2011 and 2015 reflects the salience of the MOI policy in expediting the segregating tendencies of the DSS between 1999 and 2011. This allows us to qualify the dominant narrative of the inequitable consequences of marketization and choice policies by providing a more nuanced account of the configuration of socio-economic and linguistic segregation in Hong Kong. Without being attuned to the institutional context and locally specific developments, policy intervention aiming at rectifying the stratifying effects of the education system could be rendered ineffectual.

Before concluding our discussion, it is important for one to bear in mind that in this study we did not explicitly assess the causal link between specific education reform strategies, trends of school segregation and the way such segregation maps onto lines of division in terms of

public–(semi-)private schooling and MOI (between 1998 and 2015). Also, our discussion of the private secondary sector focuses on DSS schools only. What awaits critical scrutiny is how international schools, which have been gradually increasing in number and proportion, factor into school segregation. Given the de-regulation of international schooling in Hong Kong, a majority of 'local' upper-middle-class parents compete to send their children to elitist and expensive international schools (Lee and Wright 2015). This tendency has been reinforced by well-off mainland Chinese parents who have become the new stakeholders in top-tier international schools in Hong Kong. Lee, Wright, and Walker (2016) depicted this emerging educational stratification in Hong Kong and East Asia as 'skyboxification' (see Sandel 2012), which refers to the increasing marketization of public spheres where more and more privileged families are living in physical, socio-economic and educational separation from their less privileged counterparts. This suggests an increasing socio-economic divide within a hitherto 'disadvantaged' Chinese 'immigrant' population (Yuen and Lee 2016), which is set to reconfigure divisions, if not segregation, along lines of class and migration status in local education. How the linguistic symbolic order factors in is also expected to be complicated now that Putonghua is increasingly adopted as the MOI in international schools (alongside English), and gradually across the territory. To what extent this could have explained the erosion of the relevance of EMI schooling to the stratifying tendencies as observed cannot be ascertained in our study. On top of this, the relevance of the intersection of class and linguistic isolation to the educational outcomes of the Chinese ethnic 'majority' cannot be assumed to be the same in the case of South Asian ethnic minorities. For Indians, Nepalese and Pakistanis, who together made up 1% of the total population in 2016 (Census and Statistics Department 2017), their disadvantage in Chinese rather than English language exposure and learning has not been redressed despite desegregation initiatives beginning from 2013/14 (for details, see Shum, Gao, and Ki 2016, 533–537). The explanatory power of our presented analysis thus does not extend to South Asian students. Shum, Gao, and Ki's (2016) analysis also foregrounds the relevance of internal segregation in the production of variations in educational outcomes in de-segregated environments. Given less capable students' disadvantage of learning in environments of heightened learning diversity as resulted from the removal of the EMI–CMI bifurcation (Poon et al. 2013 as quoted in Poon 2013), we cannot discount the impact of internal segregation at school level in our interpretation of trends of segregation between 2011 and 2015.

It should also be acknowledged that we did not empirically evaluate how micro-level choice-making processes materialize macro-level segregating tendencies in a changing institutional context. In this respect, Lam's (2012) study attests to the role of the management of academic, social and psychological risks in the making of decisions to avert EMI schooling among socially disadvantaged mothers. A qualitative lens is expected to enrich our understanding of how policy changes, emerging demographic trends and school segregation will transpire and be felt in parents' and students' negotiation of the school market. Moreover, because the TIMSS covers only cognitive skills such as mathematics and science achievement, overlooking other academic subjects as well as non-cognitive skills (e.g. perseverance, self-esteem, motivation and resilience), we were not able to address how inequality in these non-cognitive skills and other academic subjects changed over time. The TIMSS also excluded students with special education needs and non-native language speakers, which might affect the representativeness of the target population and, in turn, our results. Finally, because TIMSS 2019 data were not available when this study was conducted, we were unable to examine how patterns have changed since 2015.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Funding

This research was supported by the Global Research Network program through the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2017S1A2A2040115); Penn State Population Research Institute, which is supported by an infrastructure grant from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (P2CHD041025). This research was also supported by a visiting fellowship from the Seoul National University Asia Center.

References

Ball, S. J. 2003. *Class Strategies and the Education Market*. London: Routledge Falmer.

Ball, S. J., and D. Youdell. 2008. *Hidden Privatization in Public Education*. Brussels: Educational International.

Beach, D., and O. Sernhede. 2011. "From Learning to Labour to Learning for Marginality: School Segregation and Marginalization in Swedish Suburbs." *British Journal of Sociology of Education* 32 (2): 257–274. doi:10.1080/01425692.2011.547310.

Borman, K. M., T. Eitle, D. Michael, D. J. Eitle, R. Lee, L. Johnson, D. Cobb-Roberts, D. Dorn, and B. Shircliffe. 2004. "Accountability in a Post Desegregation Era: The Continuing Significance of Racial Segregation in Florida's Schools." *American Educational Research Journal* 41 (3): 605–631. doi:10.3102/00028312041003605.

Brown, P., and H. Lauder. 1996. "Education, Globalization and Economic Development." *Journal of Education Policy* 11 (1): 1–25. doi:10.1080/0268093960110101.

Byun, S., and K. Kim. 2010. "Educational Inequality in South Korea: The Widening Socioeconomic Gap in Student Achievement." *Changing Demographics, and Educational Challenges in East Asia Research in Sociology of Education* 17: 155–182.

Byun, S., K. Kim, and H. Park. 2012. "School Choice and Educational Inequality in South Korea." *Journal of School Choice* 6 (2): 158–183. doi:10.1080/15582159.2012.673854.

Census and Statistics Department. 2017. 2016 Population By-census: Main results. Accessed 9 October 2017. https://www.bycensus2016.gov.hk/en/

Cheung, A. C. K., E. V. Randall, and M.-K. Tam. 2005. "Expanding the Private School Sector: Government Policy and Private Secondary Schools in Hong Kong, 1988–2001." *International Journal of Educational Policy, Research, and Practice* 6 (1): 139–172.

Choi, P. K. 2003. "'The Best Students Will Learn English': Ultra-Utilitarianism and Linguistic Imperialism in Education in Post-1997 Hong Kong." *Journal of Education Policy* 18 (6): 673–694. doi:10.1080/0268093032000145917.

Chubb, J. E., and T. M. Moe. 1990. *Politics, Markets and America's Schools*. Washington, DC, The Brookings Institution.

Coldron, J., C. Cripps, and L. Shipton. 2010. "Why Are English Secondary Schools Socially Segregated?" *Journal of Education Policy* 25 (1): 19–35. doi:10.1080/02680930903314285.

Coleman, J. 1992. "Some Points on Choice in Education." *Sociology of Education* 65 (4): 260–262. doi:10.2307/2112769.

Dronkers, J., and M. Levels. 2006. Social-economic and ethnic school-segregation in Europe and Australia and educational achievement of migrant-pupils coming from various regions of origins. *Presented in the Spring meeting 2006 of the ISA Research Committee on Social Stratification and Mobility*, May 11th–14th 2006, Nijmegen, Netherlands.

Education Bureau. 2012. 2012/13 Student enrolment statistics. Available online at: http://www.edb.gov.hk/en/about-edb/publications-stat/figures/index_1.html (accessed 16 October, 2017)

Education Department. 2001. *Enrolment Statistics 2000*. Hong Kong, Statistics section, Education Department.
Education and Manpower Bureau. 2003. *Education Statistics 2003*. Hong Kong, Education and Manpower Bureau.
Falvey, P.. 1988. "ESL, EFL & language acquisition in the context of Hong Kong." *In Teaching Language and Culture: Building Hong Kong on Education*, edited by B. Asker, 73–85. Hong Kong, China: Addison Wesley.
Gewirtz, S., S. Ball, and R. Bowe. 1995. *Markets, Choice and Equity in Education*. (Buckingham/ Philadelphia, Open University Press).
Gorard, S., and J. Fitz. 2006. "What Counts as Evidence in the School Choice Debate?" *British Educational Research Journal* 32 (6): 797–816. doi:10.1080/01411920600989438.
Ho, C. 2011. 'My School' and others: Segregation and white flight. Accessed 16 January 2019. https://www.nswtf.org.au/files/my_school_and_others_-_christine_ho_may_2011.pdf
Ho, S. C. 2010. "Family Influences on Science Learning among Hong Kong Adolescents: What we Learned from PISA." *International Journal of Science and Mathematics Education* 8 (3): 409–428. doi:10.1007/s10763-010-9198-3.
James, D. R., and K. Taeuber. 1985. "Measures of Segregation." *Sociological Methodology* 14: 1–32.
Johnson, D. R., and R. Young. 2011. "Toward Best Practices in Analyzing Datasets with Missing Data: Comparisons and Recommendations." *Journal of Marriage and Family* 73 (5): 926–945. doi:10.1111/j.1741-3737.2011.00861.x.
Kan, V., and B. Adamson. 2010. "Language Policies for Hong Kong Schools since 1997." *London Review of Education* 8 (2): 167–176. doi:10.1080/14748460.2010.487336.
Lam, O.-Y. 2012. School choice-making, mothers' involvement in children's education and social reproduction in the education market in Hong Kong. PhD diss., The University of Manchester.
Lam, T. Y. P., and K. C. Lau. 2014. "Examining Factors Affecting Science Achievement of Hong Kong in PISA 2006 Using Hierarchical Linear Modeling." *International Journal of Science Education* 36 (15): 2463–2480. doi:10.1080/09500693.2013.879223.
Lee, M., and E. Wright. 2015. "Elite Schools in International Education Markets in East Asia: Emerging Patterns, Successes, and Challenges." In *Handbook of Research in International Education*, edited by M. Hayden, J. Levy, and J. Thompson, 583–597. London, UK: Sage.
Lee, M., E. Wright, and A. Walker. 2016. "The Emergence of Elite International Baccalaureate Diploma Programme Schools in China: A 'Skyboxification' Perspective." In *Elite Schools: Multiple Geographies of Privilege*, edited by A. Koh and J. Kenway, 50–69. London, UK: Routledge.
Lin, A. M. Y. 1996. "Bilingualism or Linguistic Segregation? Symbolic Domination, Resistance and Code Switching in Hong Kong Schools." *Linguistics and Education* 8 (1): 49–84. doi:10.1016/S0898-5898(96)90006-6.
Lo, Y. Y., and E. S. C. Lo. 2014. "A Meta-Analysis of the Effectiveness of English-Medium Education in Hong Kong." *Review of Educational Research* 84 (1): 47–73. doi:10.3102/0034654313499615.
Lundahl, L., I. E. Arreman, A. Holm, and U. Lundström. 2013. "Educational Marketization the Swedish Way." *Education Inquiry* 4 (3): 22620–22517. doi:10.3402/edui.v4i3.22620.
Massey, D. S., and N. A. Denton, 1988. "The Dimensions of Residential Segregation." *Social Forces* 67: 281–315.
Mickelson, R. A. 2014. "The Problem of the Color Lines in Twenty-First-Century Sociology of Education: Researching and Theorizing Demographic Change, Segregation, and School Outcomes." *Social Currents* 1 (2): 157–165. doi:10.1177/2329496514524544.
Mullis, I. V. S., M. O. Martin, and P. Foy. 2008. TIMSS 2007 international mathematics report Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College. http://timss.bc.edu/timss2007/PDF/TIMSS2007_InternationalMathematicsReport.pdf
Oh, J. 2011. "High School Diversification against Educational Equality: A Critical Analysis of Neoliberal Education Reform in South Korea." *Asia Pacific Education Review* 12 (3): 381–392. doi:10.1007/s12564-011-9147-z.
Olson, J. F., M. O. Martin, and I. V. S. Mullis. 2008. TIMSS 2007 technical report. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College. http://timss.bc.edu/timss2007/PDF/TIMSS2007_TechnicalReport.pdf
Orfield, G., and C. Lee. 2005. *Why Segregation Matters: Poverty and Educational Inequality*. Cambridge, MA: The Civil Rights Project, Harvard University.

Ou, D., and S. Pong. 2013. "Human Capital and the Economic Assimilation of Recent Immigrants in Hong Kong." *Journal of International Migration and Integration* 14 (4): 689–710. doi:10.1007/s12134-012-0262-4.

Pong, S., and D. Post. 1991. "Trends in Gender and Family Background on School Attainment: The Case of Hong Kong." *British Journal of Sociology* 42 (2): 249–271. doi:10.2307/590370.

Pong, S., and W. K. Tsang. 2010. "The Educational Progress of Mainland Chinese Immigrant Students in Hong Kong." *Research in the Sociology of Education* 17: 201–230.

Poon, A. Y. K., C. M. Y. Lau, and D. H. W. Chu, 2013. "Impact of the Fine-tuning Medium-of-instruction Policy: Some Preliminary Findings." *Literacy Information and Computer Education Journal* 4 (1): 946–954.

Poon, A. Y. K. 2013. "Will the New Fine-Tuning Medium-of-Instruction Policy Alleviate the Threats of Dominance of English-Medium Instruction in Hong Kong?" *Current Issues in Language Planning* 14 (1): 34–51. doi:10.1080/14664208.2013.791223.

Poon, A. Y. K., and Y.-C. Wong. 2008. "Education Reform in Hong Kong: The 'Through-Road' Model and Its Societal Consequences." *International Review of Education* 54 (1): 33–55. doi:10.1007/s11159-007-9073-9.

Post, D. 2010. "Postsecondary Educational Expansion and Social Integration in Hong Kong." *Globalization, Changing Demographics, and Educational Challenges in East Asia Research in Sociology of Education* 17: 231–269.

Reardon, S. F., and A. Owens. 2014. "60 Years after Brown: Trends and Consequences of School Segregation." *Annual Review of Sociology* 40 (1): 199–218. doi:10.1146/annurev-soc-071913-043152.

Robert, P. 2010. "Social Origin, School Choice, and Student Performance." *Educational Research and Evaluation* 16 (2): 107–129. doi:10.1080/13803611.2010.484972.

Roda, A., and A. S. Wells. 2013. School choice policies and racial segregation: Where white parents' good intentions, anxiety, and privilege collide. Faculty Works: Education. 46. Accessed 16 October 2019. https://digitalcommons.molloy.edu/edu_fac/46

Rubin, D. B. 1987. *Multiple Imputation for Nonresponse in Surveys.* New York, NY: John Wiley.

Sandel, M. 2012. *What Money Can't Buy: The Moral Limits of Markets*. New York, NY: Farrar Strauss Giroux.

Saporito, S. 2003. "Magnet School Choice and Segregation by Race and Poverty." *Social Problems* 50 (2): 181–203. doi:10.1525/sp.2003.50.2.181.

Shum, M., F. Gao, and W. W. Ki. 2016. "School Desegregation in Hong Kong: Non-Chinese Linguistic Minority Students' Challenges to Learning Chinese in Mainstream Schools." *Asia Pacific Journal of Education* 36 (4): 533–544. doi:10.1080/02188791.2015.1005048.

Townsend, T., J. Macbeath, and I. Bogotch. 2016. "Critical and Alternative Perspectives on Educational Effectiveness and Improvement Research." In *The Routledge International Handbook of Educational Effectiveness and Improvement*, edited by C. Chapman, D. Muijs, D. Reynolds, P. Sammons, and C. Teddlie, 380–407. London: Routledge.

Tsang, W.-K. 2002. *New Elitism and the New Direct Subsidy School Scheme: Critique on the Erosion of Education Capital*. Hong Kong: The Hong Kong Institute of Educational Research, Faculty of Education, The Chinese University of Hong Kong. (In Chinese)

Tse, T. K.-C. 2008. "Choices for Whom? The Rhetoric and Reality of the Direct Subsidy Scheme in Hong Kong (1988–2006)." *Education and Urban Society* 40 (5): 628–652.

Valenzuela, J. P., C. Bellei, and D. de los Ríos. 2014. "Socioeconomic School Segregation in a Market-Oriented Educational System: The Case of Chile." *Journal of Education Policy* 29 (2): 217–241. doi:10.1080/02680939.2013.806995.

von Hippel, P. 2005. "How Many Imputations Are Needed? A Comment on Hershberger and Fisher (2003)." *Structural Equation Modeling* 12 (2): 334–335. doi:10.1207/s15328007sem1202_8.

Willms, J. D. 1986. "Social Class Segregation and Its Relationship to Pupils' Examination Results in Scotland." *American Sociological Review* 51 (2): 224–241. doi:10.2307/2095518.

Yuen, C., and M. Lee. 2016. "Mapping the Life Satisfaction of Adolescents in Hong Kong Secondary Schools with High Ethnic Concentration." *Youth and Society* 48 (4): 539–556. doi:10.1177/0044118X13502060.

Zhou, Y., T. Cai, and D. Wang. 2016. "Social Segregation in Hong Kong's Schools: 2000–2012." *Chinese Sociological Review* 48 (3): 248–270. doi:10.1080/21620555.2016.1166340.

Appendix 1

Table A1. Weighted descriptive statistics for achievement and socio-economic status across cohorts.

	1995			1999			2003			2007			2011			2015		
Variable	M	SE	% imputed	M	SE	% imputed	M	SE	% imputed	M	SE	% imputed	M	SE	% imputed	M	SE	% imputed
Mathematics	575.69	101.20	0.0	582.06	73.11	0.0	586.05	71.93	0.0	572.49	93.75	0.0	585.57	84.48	0.0	594.25	78.41	0.0
Science	508.41	88.35		529.55	69.59		556.09	65.55		530.21	80.98		535.06	75.12		545.76	71.52	
SES[a]	−0.03	0.01	13.1	−0.04	0.02	15.5	−0.04	0.02	13.3	−0.03	0.02	16.2	−0.04	0.02	18.8	0.03	0.02	22.0
Sample size																		
Student	6,752			5,179			4,972			3,470			4,015			4,155		
School	86			137			125			120			117			133		

M, mean; SE, standard error.[a] A standardized composite of parental education, number of books and home possessions. SES, socio-economic status.